

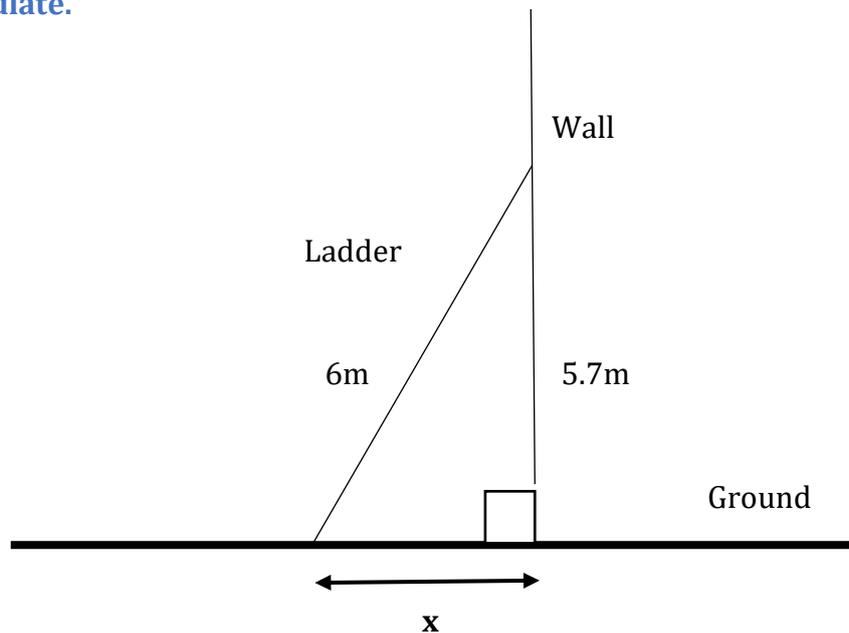
## Pythagoras' Theorem – Lesson 8

Today we will continue to use Pythagoras' theorem to solve problems. Today's problems will be a tiny bit more demanding because you will have to draw your own diagrams.

### Example

A ladder is 6m long. It is placed against a wall so that the top of the ladder touches the wall 5.5m above the ground. How far out from the wall is the foot of the ladder? Round your answer to two decimal places.

With this problem we need to draw our own diagram. This will help us to see what we need to calculate.



You may need to read the question a couple of times and it may take you a minute or two to get your diagram right – this is an important part of the problem solving process so don't rush it!

Finally: -

$$\begin{aligned}x^2 &= 6^2 - 5.7^2 \\ &= 36 - 32.49 \\ &= 3.51 \\ x &= \sqrt{3.51} = 1.873499.....\end{aligned}$$

The foot of the ladder is 1.87m from the bottom of the wall.

(Notice that, in solving this problem, we assumed that the wall was vertical, and the ground was horizontal so we get a right angled triangle.)

Now solve these problems, taking your time and drawing a diagram.

<p>1) A ladder reaches 3m up a wall. The foot of the ladder is 1m back from the base of the wall. How long is the ladder? Round your answer to two decimal places.</p>
<p>2) A ladder is 4m long. The foot of the ladder is placed 1m from the base of a wall. How far up the wall does the ladder reach? Round your answer to two decimal places.</p>
<p>3) A ship sails 6km South and then 4km West. How far must it sail in a straight line to get back to its starting point? Round your answer to one decimal place.</p>
<p>4) One plane is 7km North of the airport. Another plane is 10km East of the airport. How far apart are the planes? Round your answer to one decimal place.</p>
<p>5) Anna lives North of the city centre. Bob lives 6km West of the town centre. If it is 11km from Bob's house to Anna's house in a straight line, how far North of the city centre does Anna live? Round your answer to one decimal place.</p>
<p>6) A rectangular door is 80cm wide and 210cm high. Calculate the distance from the bottom left corner to the top right corner. Round your answer to the nearest centimetre.</p>
<p>7) A rectangular field is 600m long and 400m wide. To get from one corner of the field to the opposite corner of the field Jill can either walk 600m along one side and 400m along the other side or she can cut diagonally across the field. How much shorter is it to cut diagonally across the field? Round your answer to the nearest metre.</p>
<p>8) A joiner is making a rectangular gate. It is 3m wide and 1m high. He wants to put a piece of wood from the top left corner to the bottom right corner to strengthen the gate. The longest piece of suitable wood he has left is 3.4m. Does he need to go and buy some more wood?</p>

Continued below ↓

### 9) A challenge! (optional)

- Six runners enter a race.
- The runners start from points 30m apart along a straight line.
- The finishing point G is 200m from F and angle AFG is a right angle.
- The runner at A starts first, the runner at B one second later and so on.
- Each runner runs at 10 metres per second.

In what order do the runners finish?

